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of the Meteorological Commission of Cape Colony for 1903. There is a fair increase in the number of ordinary stations over 1902, but the rainfall stations show a decrease of 31. This is due to the fact that, owing to a drought, many farmers have 'trekked' with their cattle to adjoining territories, leaving their homesteads unoccupied.

MR. D. E. HUTCHINS, of Cape Town, discusses the relation of the rainfalls of South Africa and of India during the period 1892-1902, and finds that the years of famine in India have been followed by years of bad drought in South Africa. The belief is expressed that the summer rains of South Africa have their origin in the moist winds from the Indian Ocean (*Nature*, Vol. 71, 1905, 342-344).

R. DEC. WARD.

A CONTEMPLATED MAGNETIC SURVEY OF
THE NORTH PACIFIC OCEAN BY
THE CARNEGIE INSTITUTION.

A PROJECT for a magnetic survey of the North Pacific Ocean by the Department of International Research in Terrestrial Magnetism has been favorably acted upon by the executive committee of the Carnegie Institution of Washington, and authorization has been given to begin the work this year. An initial allotment of \$20,000 has been made to cover the expenses for the current year.

As is well known, the state of our knowledge of the distribution of the magnetic forces over the greater portion of the earth—the oceanic areas—owing to the paucity of precise data, is exceedingly unsatisfactory. This fact is especially true for that great body of water—the Pacific Ocean—rapidly developing in great commercial importance.

Captain Creak, for many years superintendent of the Compass Department of the British Admiralty, now retired, says: 'The North Pacific Ocean is, with the exception of the voyage of the *Challenger*, nearly a blank as regards magnetic observations, and I, therefore, think the magnetic survey proposed will be of great value.'

Hence, except for data from occasional expeditions and such as were acquired in wooden vessels a long time ago, the present magnetic charts used by the navigator over this region

depend largely upon the observations on islands and along the coasts. Such land observations, however, are rarely representative of the true values because of prevalent local disturbances. It is, therefore, impossible to make any statement as to the correctness of the present charts. The demands of science, as well as those of commerce and navigation, require a systematic magnetic survey of this region under the most favorable conditions possible and that the work be done under the auspices of some recognized research institution in order to insure that the scientific aspects of the work receive their adequate recognition.

The eminent physicist and magnetician, Professor Arthur Schuster, states as his opinion: "I believe that no material progress of terrestrial magnetism is possible until the magnetic constants of the great ocean basins, especially the Pacific, have been determined more accurately than they are present. There is reason to believe that these constants may be affected by considerable systematic errors. It is possible that these errors have crept in by paying too much attention to measurements made on islands and along the sea-coast. What is wanted is more numerous and more accurate observations on the sea itself." Furthermore, the superintendent of the United States Coast and Geodetic Survey, Mr. O. H. Tittmann, says: "There is no doubt in my mind that a survey for that purpose would result in obtaining data of great and permanent value and that it should be undertaken."

Additional quotations could be given; the above, however, are representative and show sufficiently the great importance of the proposed work and the fruitful results that may confidently be expected. It is the hope that upon the completion of the magnetic survey of the North Pacific, the means will be forthcoming for extending the survey so as to include other oceanic areas. An effort will, furthermore, be made to secure the interest and cooperation of all civilized countries, so that we may look forward to the completion of a general magnetic survey of the accessible portions of the globe within about fifteen

years. Thanks to the awakening and renewed interest in magnetic work shown on all sides, I fully believe that this hope will be realized.

The matter of prime consideration in magnetic work at sea is the elimination of the effects resulting from the ship's own magnetism as due to her construction and equipment. Such effects are especially troublesome to eliminate when it is proposed to obtain not only the magnetic declination at sea, but also the other magnetic elements (the dip and the intensity of the magnetic force). The plan, therefore, to be attempted this year, as worked out by Mr. G. W. Littlehales, hydrographic engineer of the United States Hydrographic Office and consulting hydrographer of the Department of Terrestrial Magnetism of the Carnegie Institution, is in brief as follows: "To charter a wood-built, non-magnetic, sailing vessel of about six hundred tons displacement, which, starting out in summer from San Francisco, shall pursue a clockwise spiral course embracing the entire North Pacific Ocean. The object of planning such a course is to gain continuous advantage throughout the survey of the dynamical agencies of the atmosphere and the ocean, in passing in succession into each of the five-degree quadrangles into which the chart* is divided and in which observed values of the three magnetic elements need to be obtained.

"The seasonal shifting of the permanent centers of barometric pressure will cause a variation from month to month of the conditions of wind and current that are represented on this particular chart, but if the departure from San Francisco be taken in the summer, the chain of meteorological events will contribute toward the maximum progress over the course, passing thence along the west coast of America to the vicinity of the Galapagos Islands, thence across the Pacific in latitude between two and three degrees north, thence along the eastern side of the Philippine Archipelago and the empire of Japan, thence eastward in about latitude fifty-two degrees north, thence to the latitude of

San Francisco, and thence continuing through the series of areas bounded by parallels of latitude and meridians of longitude each five degrees apart, lying next on the midocean side of the circuit last made, and proceeding gradually and by successive circuits into the central region of the North Pacific."

The total length of the course marked out is about 70,000 knots; however, each of the first circuits practically closes at San Francisco, so that, if it is found that the method pursued is not the best, the work can readily be terminated or modified. From inquiries made, it would appear that the entire work of observation and reduction can be accomplished in three years. The cost per month of the field work, inclusive of all expenses and services, will approximate \$1,500. Counting eight months of continuous service per annum, the total annual outlay is estimated at about \$12,000.

This project as the result of careful consideration and solicitation of expert opinion is believed to be thoroughly feasible. It permits of useful comprehensive results being immediately obtained, and is one which can be interrupted without any important waste of antecedent expense, whenever circumstances may render a discontinuance or a modification of the original plan advisable.

The region it is proposed at present to survey fortunately contains magnetic observatories in requisite number and proper distribution for furnishing the necessary corrections to be applied to the observed magnetic elements in order to reduce them to a common epoch. Thus continuous records of the magnetic variations required for this purpose will be available from the following stations: Sitka, Mexico, Honolulu, Manila, Shanghai, Tokio. In addition it is hoped that there may be soon a magnetic observatory in California or vicinity for lending effective co-operation, and that the German government will continue its magnetic observatory at Apia throughout the period of the survey. Also excellent opportunities for controlling instrumental constants and obtaining required additional data will be afforded by stations on the coasts and on islands.

* The course to be followed was shown in red ink on a U. S. Hydrographic Office Pilot Chart of the North Pacific.

It should also be pointed out that the plan of the courses as mapped permits ready adjustment of the observed quantities for closed areas, in accordance with the potential hypothesis, and it may permit to a certain degree the testing of the accuracy of this assumption, though as regards the latter more can be said at the end of a year's work.

While it is not anticipated that any marked irregularities in the distribution of the earth's magnetism will manifest themselves over the deep waters of the Pacific, it may confidently be expected that in the neighborhood of the islands and along the coasts distortions and irregularities will be revealed. With the aid of the results of the detailed magnetic survey of the United States and Alaska, opportunity will, therefore, be afforded of studying the effect of the configuration of land and water upon the distribution of the magnetic forces. The first circuit, passing as it does along the American and Asiatic coasts, will yield especially interesting results in this respect. Thus, for example, along the Aleutian Islands marked local disturbances will be disclosed. Reports are received frequently from mariners in this region regarding the unsatisfactory behavior of the compass; it is, therefore, greatly to be desired that a systematic magnetic survey of the waters in this region be made.

Additional information regarding the expedition will be given later.

L. A. BAUER,
Director.

DEPARTMENT OF TERRESTRIAL MAGNETISM,
CARNEGIE INSTITUTION,
WASHINGTON, D. C.

THE ELIZABETH THOMPSON SCIENCE FUND.

THE thirtieth meeting of the board of trustees was held at the Harvard Medical School, Boston, Mass., on March 17. The following officers were elected:

President—Henry P. Bowditch.
Treasurer—Charles S. Rackemann.
Secretary—Charles S. Minot.

The report of the treasurer, showing a balance of income on hand of \$1,237.79, was ac-

cepted and placed on file. The secretary reported that the following grant had been made:

No. 116, \$150, to W. Bateson, Esq., for experiments on heredity in rabbits, to be conducted under Mr. Bateson's direction by Mr. C. C. Hurst.

Reports of progress were received from the following recipients of grants:

No. 27. E. Hartwig.
No. 60. F. Kruger.
No. 94. A. M. Reese.
No. 96. H. E. Crampton.
No. 98. J. Weinzirl.
No. 101. T. A. Jaggard, Jr.
No. 103. E. Anding.
No. 106. W. Valentiner.
No. 107. M. W. Travers.
No. 108. B. L. Seawell.
No. 109. A. Nicolas.
No. 110. H. S. Grindley.
No. 111. R. Hürthle.
No. 112. W. J. Moenkhaus.
No. 113. S. P. Fergusson.
No. 114. W. Rosenthal.
No. 115. H. S. Carhart.
No. 116. W. Bateson.

The work having been completed and published, it was voted to close the records for the following grants:

No. 71. A. Nicolas.
No. 79. H. S. Grindley.
No. 100. H. H. Field.
No. 102. E. O. Jordan.
No. 104. W. P. Bradley.

It was further voted that the work having been completed, the records of the following grants should be closed, when copies of the published results were received by the trustees:

No. 65. O. Lubarsch.
No. 73. J. von Kennell.
No. 83. W. L. Tower.

Mr. F. W. Bancroft, who held grant No. 97, reported that his experiments had been made for the transplantation of ovaries in rabbits, but that he had not succeeded in obtaining ova from such transplanted ovaries. It was deemed, therefore, inadvisable to continue the research, and it was voted to close the record of his grant, and to allow him to use the material which he had on hand for other researches.